

3-TERMINAL ADJUSTABLE REGULATORS

1.Description

The LM317 is an adjustable 3-terminal positive voltage regulator, designed to supply 1.5A of output current with voltage adjustable from 1.25V~32V.

2.Features

- Typical 1% Output Voltage Tolerance
- Output Voltage Adjustable from 1.25V~32V
- Output Current in Excess of 1.5A
- Internal Short Circuit Protection
- Internal Over Temperature Protection
- Output Transistor Safe Area Compensation

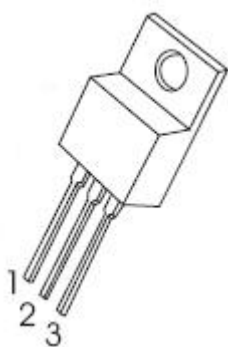
3.Applications

- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD Player
- Network Interface Card/Switch
- Telecom Equipment
- Printer and other Peripheral Equipment

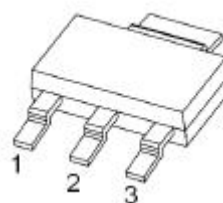
4.Order information

Mode	Package	Ordering Number	Packing Option
LM317	TO-220	LM317YTO220G/TB	Tube,50
	SOT-223	LM317YSOT223G/TR	Tape and Reel,2500
	TO-263	LM317YTO263G/TR	Tape and Reel,800
	TO-252	LM317YTO252G/TR	Tape and Reel,2500

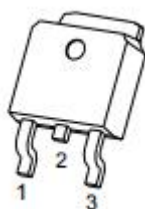
5.Pin Configuration (Top View)



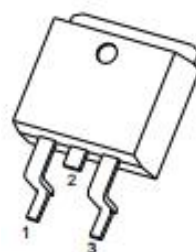
TO-220



SOT-223



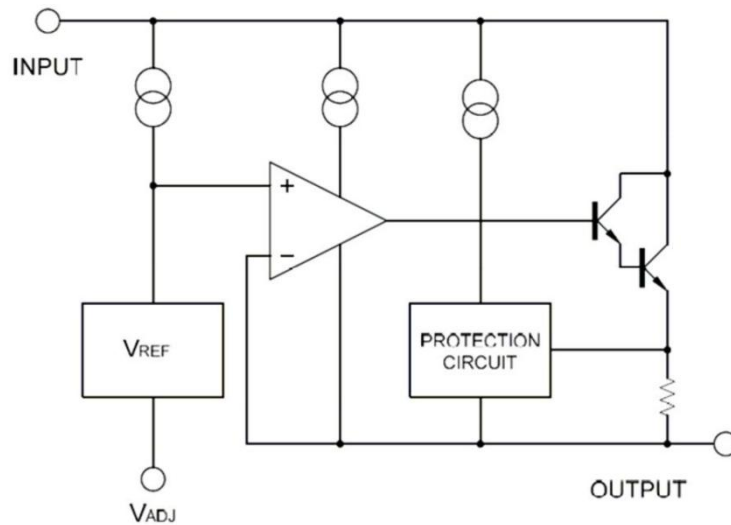
TO-252



TO-263

Pin Name	TO-220	SOT-223	TO-252	TO-263	Pin Function
Adj	1	1	1	1	Adjustment pin. Connect to a resistor divider to set V_{OUT} .
Output	2	2	2	2	Output Voltage Pin
Input	3	3	3	3	Input Voltage pin

6.Functional Block Diagram



7.Absolute Maximum Ratings

($T_A=25^{\circ}\text{C}$)*

Parameter	Symbol	Min	Max	Unit
Input -Output Voltage Differential	$V_{IN}-V_{OUT}$		32	V
Power Dissipation	P_D	Internally Limited		
Maximum Operating Junction Temperature	T_J	0	125	$^{\circ}\text{C}$
Lead Temperature (Soldering, 10 seconds)	T_{LEAD}		260	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-40	150	$^{\circ}\text{C}$
ESD (human body model)	ESD		4000	V

*: Absolute maximum ratings are stress ratings only and functional device operation is not implied. The device could be damaged beyond absolute maximum ratings.

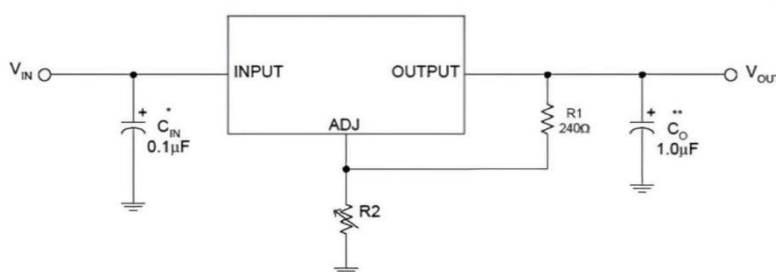
8. Electrical Characteristics

(Unless otherwise specified: $V_I - V_O = 5.0V$; $I_O = 10mA$; $T_A = 25^\circ C$)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Reference Voltage	$10mA \leq I_{OUT} \leq 1.5A$, $3V \leq V_{IN} - V_{OUT} \leq 32V$, $P_D \leq 20W$	V_{REF}	1.2	1.25	1.3	V
Line Regulation	$3V \leq V_{IN} - V_{OUT} \leq 32V$	LNR		0.01	0.04	%/V
Load Regulation	$10mA \leq I_{OUT} \leq 1.5A$	LDR		0.2	0.4	%
Adjust Pin Current		I_{ADJ}		50	100	μA
Adjust Pin Current Change	$10mA \leq I_{OUT} \leq 1.5A$, $3V \leq V_{IN} - V_{OUT} \leq 32V$, $P_D \leq 20W$	ΔI_{ADJ}		0.2	5.0	μA
Minimum Load Current	$V_{IN} - V_{OUT} = 32V$	$I_{L(MIN)}$		3.5	10	mA
Current Limit	$V_{IN} - V_{OUT} = 3V$	I_{LIMIT}	1.8	2.2		A
Ripple Rejection	$f = 120Hz$, $V_{IN} - V_{OUT} = 3V$, $C_{OUT} = 1\mu F$ Tantalum, $I_{OUT} = 1.5A$	PSRR	6.	75		dB
Temperature Stability	$T_{MIN} \leq T_J \leq T_{MAX}$			0.7		%
RMS Output Noise (% of V_{OUT})	$T_A = 25^\circ C$, $10Hz \leq f \leq 10kHz$	E_N		0.03		%/ V_O
Thermal Resistance, Junction to Case	TO-220	θ_{JC}		5		$^\circ C/W$
	TO-220F			6		
Thermal Resistance, Junction to Case	TO-220	θ_{JA}		54		$^\circ C/W$
	TO-220F			64		
Thermal Shutdown Hysteresis		Thys		25		$^\circ C$

Maximum Power Dissipation is Package Type and Case Temperature dependent.

9. Application Circuit



*= C_{IN} is required if the regulator is located near power supply filter.

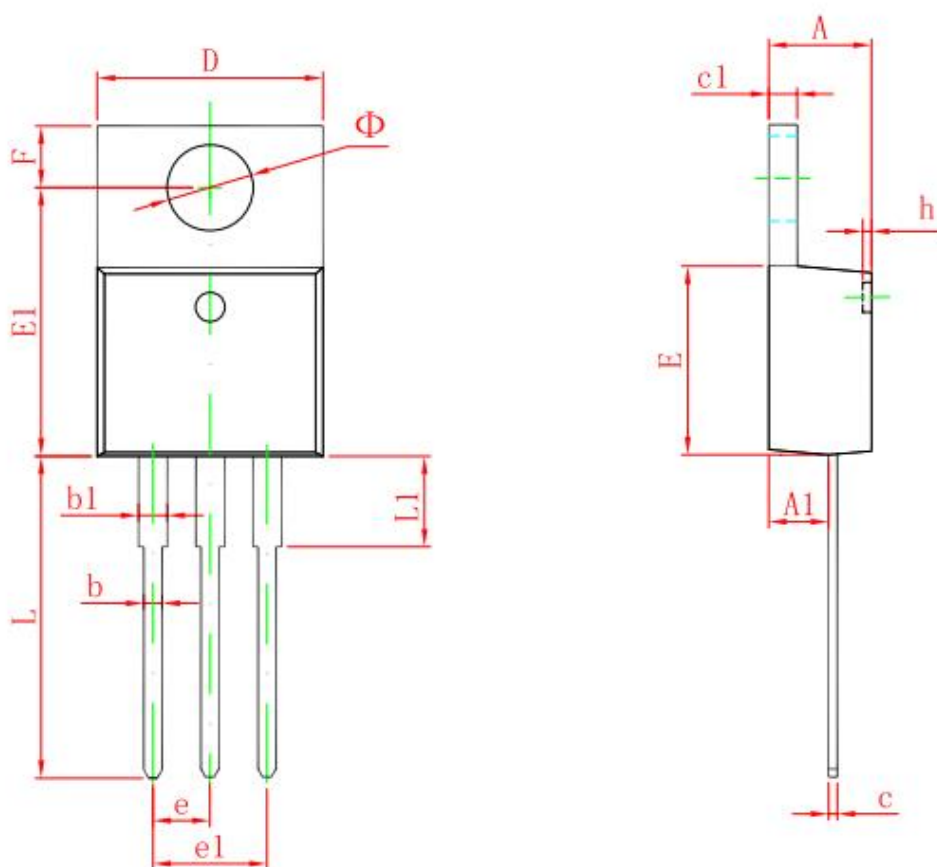
**= C_O is needed for stability and it improves transient response.

$$V_{OUT} = V_{REF} \times (1 + R_2/R_1) + I_{ADJ} \times R_2$$

Since I_{ADJ} is controlled to less than $100\mu A$, the error associated with this term is negligible in most applications.

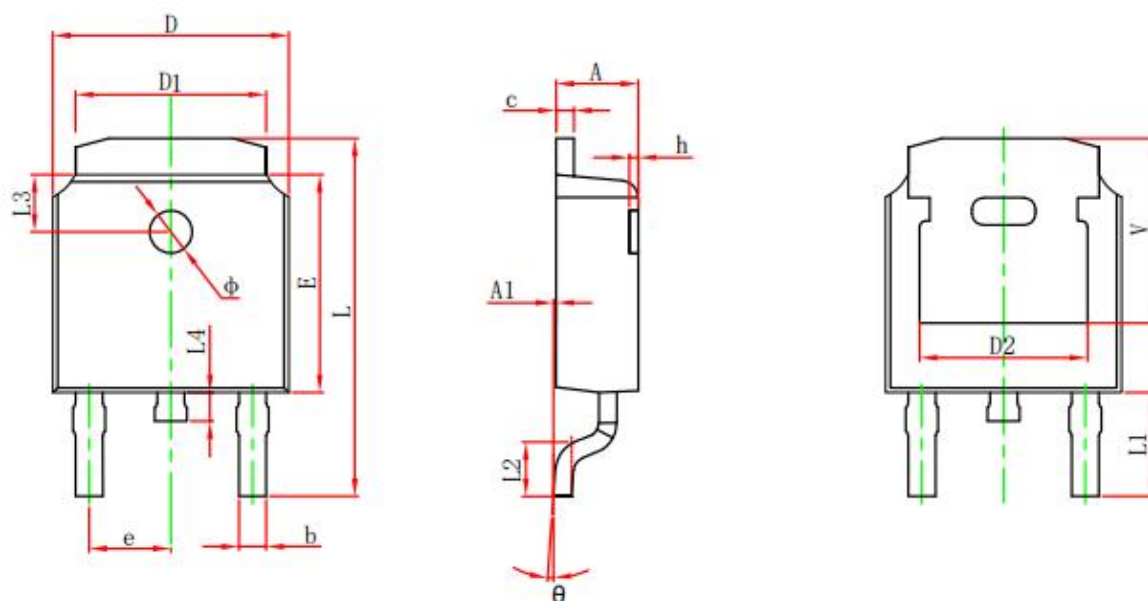
10.Package Outline Dimensions

(1) Package Type: TO-220



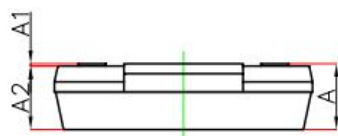
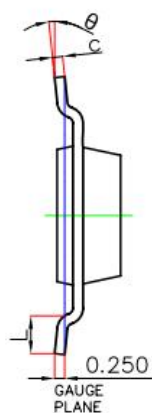
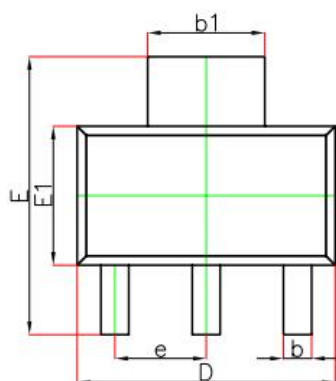
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
E1	12.060	12.460	0.475	0.491
e	2.540 TYP		0.100 TYP	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
h	0.000	0.300	0.000	0.012
L	13.400	13.800	0.528	0.543
L1	3.560	3.960	0.140	0.156
Φ	3.735	3.935	0.147	0.155

(2) Package Type: TO-252



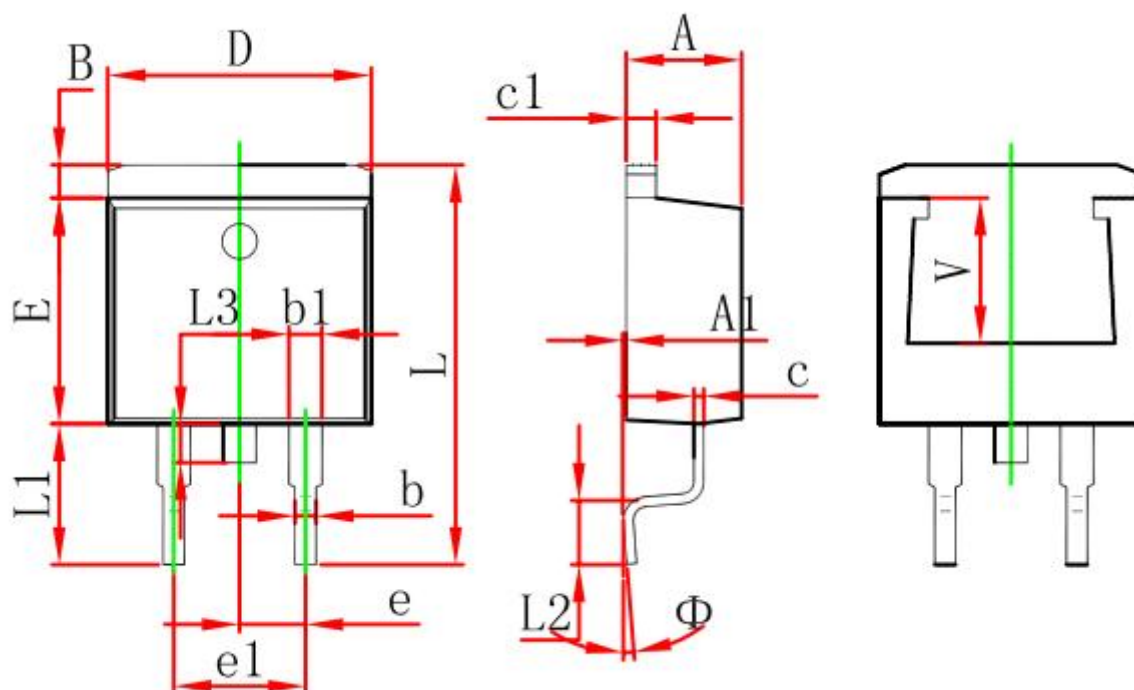
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

(3) Package Type: SOT-223



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	—	1.800	—	0.071
A1	0.020	0.100	0.001	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.840	0.026	0.033
b1	2.900	3.100	0.114	0.122
c	0.230	0.350	0.009	0.014
D	6.300	6.700	0.248	0.264
E	6.700	7.300	0.264	0.287
E1	3.300	3.700	0.130	0.146
e	2.300(BSC)		0.091(BSC)	
L	0.750	—	0.030	—
theta	0°	10°	0°	10°

(4) Package Type: SOT-263



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.120	1.420	0.044	0.056
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
L	14.940	15.500	0.588	0.610
L1	4.950	5.450	0.195	0.215
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
Φ	0°	8°	0°	8°
V	5.600 REF.		0.220REF.	

11.Important Notice And Disclaimer

- We reserves the right to change the instruction manual without prior notice.
- Any semiconductor product has a certain possibility of failure or malfunction under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design and overall manufacturing to avoid potential failure risks that may cause personal injury or property damage.
- The improvement of product quality is endless, our company will be dedicated to provide customers with better products.